MODIS DATA STUDY

TEAM PRESENTATION

February 8, 1991

AGENDA

1. Action Items
2. MODIS Ocean Team Data Requirements Overview
3. Land Science Proposals, Phase I: Salomonson, Muller, and Barnsley
4. Atmosphere Science Proposals, Phase I: King

ACTION ITEMS:

12/21/90 [Watson Gregg and Al McKay]: Combine Earth Model reports into single document. Pursue 2 additional questions: 1) how important is the geoid/spheroid difference over the oceans, and 2) how important is the difference over land, considering the types of DEM/DTM's likely to be used? Coordinate with Al Fleig to distribute report. STATUS: A conversation has been held with Bob Evans (oceans), who said he preferred the geoid. A discussion with Chris Justice (land) was also held. He requested a short write-up on the issue be sent to himself and Muller and Barnsley so they could form an informed opinion. A short write-up is delivered to Daesoo Han on 1/7/91. Open.

02/01/91 [Watson Gregg]: Review letter from Alan Strahler on MODIS-T tilt scenarios and estimate the time required to perform the tasks requested. Time to complete work estimated at 2-3 months. Task requires input from Ocean Team on tilt scenarios. STATUS: Open.

MODIS Ocean Team (MOT)

Data Requirements Overview

The MODIS Ocean Team (MOT) has coordinated their efforts to minimize duplication and to provide a complete and consistent set of data products. The result is a closely coordinated plan for data requirements, a data processing system, and development of software for processing and validation. This coordinated approach is described in the "Overview of MODIS Ocean Proposals" drafted by the MOT and dated 4/20/90. A copy of this overview is included in most of the oceans proposals.

The MOT Functional Concept is given in Figure 1. The MODIS Oceans Team Computing Facility (MOTCF) is planned to be located at the Rosentiel School of Marine and Atmospheric Science (RSMAS) in Miami, Florida. A T1-class communications link will be required for transfer of data between Oregon State University, Miami, GSFC and possibly other TM locations. This network is expected to be compatible with local networks in existence at these locations. The MOT expects EOSDIS and/or the MODIS Data Support Team (SDST) to provide this link along with networking tools, management, and interfacing software. The MOT expects the interface environment to include software development and database tools. A good discussion of these matters plus the software development process and the computer facilities requirements is given by Abbot in his proposal.

The "At Launch", "Post Launch", and "Interim" ocean data product algorithm development activities, as identified by the MOT, are given in Tables 1, 2 and 3. Table 4 summarizes the MODIS algorithm development and validation data products. The MOT expects that team members will generate additional research products on their TMCF's, and when these are sufficiently mature they will be transitioned through the SDST to the CDHF for routine production.

One salient feature of the MOT proposals is the extensive use of ancillary data for algorithm development in the pre launch phase and for calibration, validation and algorithm refinement in the post launch phase. It will be necessary to quantify these requirements and to identify responsibilities for acquiring the data and integrating it into the EOSDIS system.

Modis Ocean Team - Functional Concept

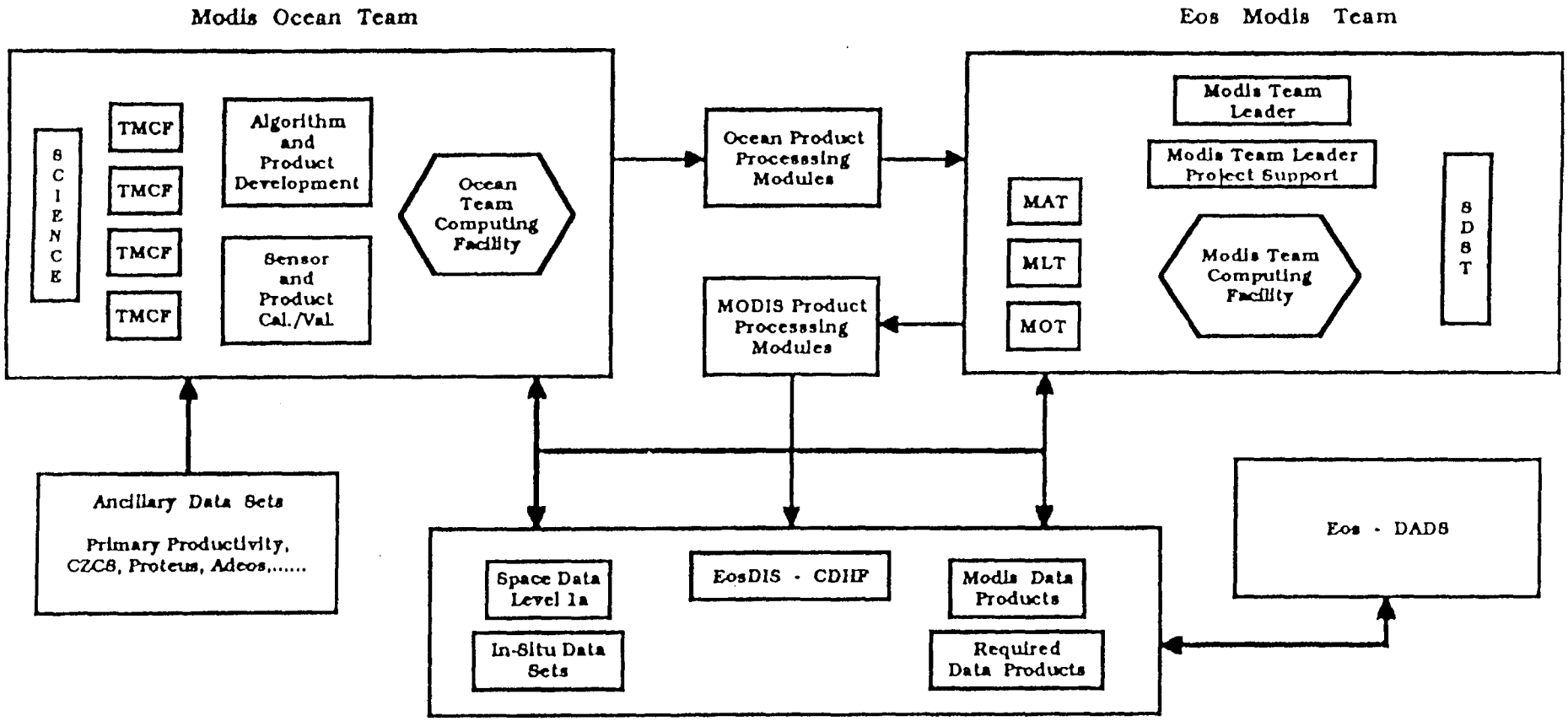

Figure 1

TABLE 1: AT LAUNCH OCEAN PRODUCT ALGORITHM DEVELOPMENT

	Product >	CHL a (I)	Chl a (II)	FLH	CZCS Pig	nLw, vis	Kd 490	Coccolith	COM (I)
	Activity \ T.M.>	CLARK	CARDER	ABBOTT	GORDON	GORDON	GORDON	GORDON	CARDER
1	product definition	SDST,RE,DC	SDST,RE,KC	MA, HG	HG	HG,RE,DC	HG	HG	SDST,RE,KC
2	systems design	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE
3	utilities	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA
4a	Algorithms (Concept)	DC,MVT	KC	MA, HG	HG	HG	HG	HG	KC,JP
4b	Equations & Coefficients	DC,MVT	KC	MA	HG,DC	RE,HG,DC	HG,DC	HG	KC,JP
4c	Prelnch at-sea algo. devel.	DC,MVT	KC	MA, MVT	Not Reqrd	HG, MVT	Not Reqrd	HG, MVT	KC,JP
4d	Postlnch at-sea algo devel.	DC,MVT	KC	MA, MVT	Not Reqrd	HG, MVT	Not Reqrd	HG, MVT	KC,JP
5	implementing code	RE	RE	MA, RE	RE	RE	RE	RE	RE
6	peer reviews	MOT,MST	MOT/MST	MOT/MST	MOT/MST	MOT/MST	MOT/MST	MOT/MST	MOT/MST
7	integrated processing sys.	RE,MA,SDST	RE/SDST	RE,MA,SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST
8	Sim. data	Not Reqrd	Not Reqrd	Not Reqrd	Not Reqrd	Not Reqrd	Not Reqrd	Not Reqrd	Not Reqrd
9	systems tests	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST
10	quality control process	SDST,RE,DC	SDST,RE,KC	MA, RE, SDST	HG,RE,SDST	HG,RE,SDST	HG,RE,SDST	HG,RE,SDST	SDST,RE,KC
11a	validation	DC,MVT	KC, MVT	MA, MVT	HG,MVT	HG	HG	HG	KC
11b	Postlaunch at-sea	DC,MVT	KC, MVT	MA, MVT	HG,MVT	HG, MVT	HG,MVT	HG, MVT	KC, MVT
12	correction of problems	SDST,RE,DC	SDST,RE,KC	SDST, MA, RE	SDST,HG,RE	SDST,HG,RE	SDST,HG,RE	SDST,HG,RE	SDST,RE,KC
13	documentation	SDST,RE,DC	SDST,RE,KC	SDST, MA, RE	SDST,HG,RE	SDST,HG,RE	SDST,HG,RE	SDST,HG,RE	SDST,RE,KC
14	management plan	VS	VS	VS	VS	VS	VS	VS	VS

	Product >	TSS	Cal Data	P. Prod. emp	Regnl SST	Global SST	Phyco.	Lt vic. cal	ChlFlu(Curv)
	Activity \ T.M.>	CLARK	EVANS	ESAIAS	BROWN	BARTON	HOGE	GORDON	HOGE
1	product definition	DC	RE, MOT	WE, RE	OB	IB	FH	HG,RE,DC	FH
2	systems design	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE
3	utilities	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA
4a	Algorithms (Concept)	DC	RE, MOT	WE,RE,MA	OB,IB	IB,OB	FH	HG	FH,WE
4b	Equations & Coefficients	DC	RE, MOT	WE,MA,HG	OB,IB	IB,OB	FH	RE,HG,DC	FH,WE
4c	Prelnch at-sea algo. devel.	DC	RE, MOT	WE,MA,HG	OB,IB	IB,OB	FH	HG,MVT	FH,MVT
4d	Postlnch at-sea algo devel	DC	RE, MOT	WE,MA,HG	OB,IB	IB,OB	FH	HG,MVT	FH,MVT
5	implementing code	RE	RE, MOT	RE	RE, OB	RE,IB,OB	RE	RE,OB,MA,WE	RE
6	peer reviews	MOT/MST	MOT/MST	MOT/MST	MOT/MST	MOT/MST	MOT/MST	MOT/MST	MOT/MST
7	integrated processing sys.	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST
8	Sim. data	Not Reqrd	Not Reqrd	Not Reqrd	Not Reqrd	Not Reqrd	Not Reqrd	Not Reqrd	Not Reqrd
9	systems tests	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE,MOT,SDST
10	quality control process	DC	RE, MOT	WE,MA,HG	SDST,RE,OB	SDST,RE,IB	FH,RE,SDST	HG,RE,SDST	FH,RE,SDST
11a	validation	DC	RE, MOT	WE,MA,HG	OB,DC,IB	IB,OB	FH	HG,MOT	FH,WE
11b	Postlaunch at-sea	DC	RE, MOT	WE,MA,HG	OB,DC,IB	IB,OB	FH, KC	HG,MVT	FH,MVT
12	correction of problems	SDST,DC	RE, MOT	SDST,WE	SDST,OB,RE	SDST,IB,RE	SDST, FH, RE	SDST,HG,RE	SDST,FH,RE
13	documentation	SDST,RE,DC	RE,MOT,SDST	SDST,WE	SDST,OB,RE	SDST,IB,RE	SDST, FH, RE	SDST,HG,RE	SDST,FH,RE
14	management plan	VS	VS	VS	VS	VS	VS	VS	VS

TABLE 1 (Cont): AT LAUNCH OCEAN PRODUCT ALGORITHM DEVELOPMENT

	Product >	COM (S. O)	La (s.s., ta<.6)	Angstrom
	Activity \ T.M.>	PARSLOW	GORDON	GORDON
1	product definition	JP	HG,RE,DC	HG,RE,DC
2	systems design	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE
3	utilities	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA
4a	Algorithms (Concept)	JP, KC	HG	HG
4b	Equations & Coefficients	JP, KC	RE,HG,DC	RE,HG,DC
4c	Prelnch at-sea algo. devel.	JP, KC	HG, MVT	HG, MVT
4d	Postlnch at-sea algo devel.	JP, KC	HG, MVT	HG, MVT
5	implementing code	RE,OB	RE,OB,MA,WE	RE,OB,MA,WE
6	peer reviews	MOT/MST	MOT/MST	MOT/MST
7	Integrated processing sys.	RE/SDST	RE/SDST	RE/SDST
8	Sim. data	Not Reqrd	Not Reqrd	Not Reqrd
9	systems tests	RE/SDST	RE/SDST	RE/SDST
10	quality control process	JP,RE,SDST	HG,RE,SDST	HG,RE,SDST
11a	validation	JP	HG*, MVT	HG*
11b	Postlaunch at-sea	JP, MVT	HG, MVT	HG, MVT
12	correction of problems	SDST,RE,JP	SDST,HG,RE	SDST,HG,RE
13	documentation	JP	SDST,HG,RE	SDST,HG,RE
14	management plan	VS	VS	VS

Key	PI
MA	Abbott
IB	Barton
OB	Brown
KC	Carder
DC	Clark
WE	Esaias
RE	Evans
RH	Hoge
HG	Gordon
JP	Parslow
VS	Salomonson
MOT	Modis Oceans Team
MVT (MODIS VIS TEAM)	MOT-MIT
MIT (MODIS IR TEAM)	BROWN & BARTON
SDST	SCIENCE DATA SUPPORT TEAM
*	Internal Consistency
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TABLE 2: POST LAUNCH OCEAN PRODUCT ALGORITHM DEVELOPMENT

	Product >	Chl a (Flu)	P. P. (Flu)	Flu. Ellic.	Stc. PAR	COM(Curv)	Pig (Curv)	% Organc SS
	Activity \ Tean Member>	ABBOTT	ABBOTT	ABBOTT	GORDON	HOGE	HOGE	CLARK
1	product delinition	MA,HG	MA	MA	HG	FH	FH	DC
2	systems design	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE
3	utilities	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA
4a	Equations & Coefficients	MA,HG	MA	MA	HG	FH	FH,WE	DC,MVT
4b	Algorithms (Concept)	MA	MA/WE	MA/WE	HG	FH	FH,WE	DC,MVT
4c	Prelnch at-sea algo. devel.	MA,MVT	MA/MOT	MA/MOT	HG, MVT	FH,MVT	FH,MVT	DC,MVT
4d	Postlnch at-sea algo devel.	MA,MVT	MA/MOT	MA/MOT	HG, MVT	FH,MVT	FH,MVT	DC,MVT
5	Implementing code	MA,RE	RE/MA	RE/MA	RE	RE	RE	RE
6	peer reviews	MOT/MST	MOD/MST	MOD/MST	MOT/MST	MOT/MST	MOT/MST	MOT,MST
7	integrated processing syst	RE,MA,SDST	RE,MA,SDST	RE,MA,SDST	RE/SDST	RE/SDST	RE,MOT,SDST	RE,MOT,SDST
8	Sim. data	Not Reqrd	Not Rqrd	Not Rqrd	Not Reqrd	Not Reqrd	Not Reqrd	Not Reqrd
9	systems tests	RE,MOT,SDST	RE,MOT,SDST	RE,MOT,SDST	RE,MOT,SDST	RE,MOT,SDST	RE/SDST	RE/SDST
10	quality control process	MA, RE, SDST	MA/RE	MA/RE	HG,RE,SDST	FH,RE,SDST	FH,RE,SDST	SDST,RE,DC
11a	validation	MA,MVT	MA	MA	HG	FH	FH,WE,MVT	DC,MVT
11b	Postlauch at-sea	MA,MVT	MA/MOT	MA/MOT	HG, MVT	FH,MVT	FH,WE,MVT	DC,MVT
12	correction of problems	SDST,MA,RE	MA/MOT/SDST	MA/MOT/SDST	SDST,HG,RE	SDST, FH, RE	SDST, FH, RE	SDST,RE,DC
13	documentation	SDST,MA,RE	SDST,MA,RE	SDST,MA,RE	SDST,HG,RE	SDST, FH, RE	SDST, FH, RE	SDST,RE,DC
14	management plan	VS	VS	VS	VS	VS	VS	VS

	Product >	K par	c, 520	s. partic.		Key	PI
	Activity \ Tean Member>	CLARK	CLARK	PARSLOW		MA	Abbott
1	product delinition	DC	DC	JP		IB	Barton
2	systems design	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE		OB	Brown
3	utilities	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA		KC	Carder
4a	Equations & Coefficients	DC,MVT	DC,MVT	JP, KC		DC	Clark
4b	Algorithms (Concept)	DC,MVT	DC,MVT	JP, KC		WE	Esaias
4c	Prelnch at-sea algo. devel.	DC,MVT	DC,MVT	JP, KC		RE	Evans
4d	Postlnch at-sea algo devel.	DC,MVT	DC,MVT	JP, KC		FH	Hoge
5	implementing code	RE	RE	RE,OB		HG	Gordon
6	peer reviews	MOT,MST	MOT,MST	MOT/MST		JP	Parslow
7	integrated processing syst	RE,MOT,SDST	RE,MOT,SDST	RE,MOT,SDST		VS	Salomonson
8	Sim. data	Not Reqrd	Not Reqrd	Not Reqrd		MOT	Modis Oceans Team
9	systems tests	RE/SDST	RE/SDST	RE/SDST		MVT (MODIS VIS TEAM)	MOT-MIT
10	quality control process	SDST,RE,DC	SDST,RE,DC	JP,RE,SDST		MIT (MODIS IR TEAM)	BROWN & BARTON
11a	validation	DC,MVT	DC,MVT	JP,MVT		SDST	SCIENCE DATA SUPPORT TEAM
11b	Postlauch at-sea	DC,MVT	DC,MVT	JP, MVT			Internal Consistency
12	correction of problems	SDST,RE,DC	SDST,RE,DC	SDST,RE,JP			20-Apr-90 13:18
13	documentation	SDST,RE,DC	SDST,RE,DC	SDST,RE,JP			
14	management plan	VS	VS	VS			

TABLE 3: INTERIM OCEAN DATA PRODUCT ALGORITHM DEVELOPMENT

	Product >	Cloud Mask	Tot scatt coef (b)	Phyto scatt (b*)	Non p scat (b-b*)	Backscatt. (bb)	Phyto bksc (bb*)	Coccolith (bbc)
	Activity \ T.M.>	GORDON	CARDER	CARDER	CARDER	GORDON	GORDON	GORDON
1	product definition	HG,RE,DC	SDST,RE,KC	SDST,RE,KC	SDST,RE,KC	HG,RE,DC	HG,RE,DC	HG,RE,DC
2	systems design	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE
3	utilities	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA
4a	Algorithms (Concept)	HG	KC,MVT	KC,MVT	KC,MVT	HG	HG	HG
4b	Equations & Coefficients	RE,HG,DC	KC,MVT	KC,MVT	KC,MVT	RE,HG,DC	RE,HG,DC	RE,HG,DC
4c	Prelnch at-sea algo. dev	HG, MVT	KC,MVT	KC,MVT	KC,MVT	HG, MVT	HG, MVT	HG, MVT
4d	Postlnch at-sea algo dev	HG, MVT	KC,MVT	KC,MVT	KC,MVT	HG, MVT	HG, MVT	HG, MVT
5	implementing code	RE	RE	RE	RE	RE	RE	RE
6	peer reviews	MOT/MST	MOT/MST	MOT/MST	MOT/MST	MOT/MST	MOT/MST	MOT/MST
7	integrated processing sy	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST
8	Sim. data	Not Reqrd	Not Reqrd	Not Reqrd	Not Reqrd	Not Reqrd	Not Reqrd	Not Reqrd
9	systems tests	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST	RE/SDST
10	quality control process	HG,RE,SDST	SDST,RE,KC	SDST,RE,KC	SDST,RE,KC	HG,RE,SDST	HG,RE,SDST	HG,RE,SDST
11a	validation	HG	KC, MVT	KC, MVT	KC, MVT	HG	HG	HG
11b	Postlaunch at-sea	HG, MVT	KC, MVT	KC, MVT	KC, MVT	HG, MVT	HG, MVT	HG, MVT
12	correction of problems	SDST,HG,RE	SDST,RE,KC	SDST,RE,KC	SDST,RE,KC	SDST,HG,RE	SDST,HG,RE	SDST,HG,RE
13	documentation	SDST,HG,RE	SDST,RE,KC	SDST,RE,KC	SDST,RE,KC	SDST,HG,RE	SDST,HG,RE	SDST,HG,RE
14	management plan	VS	VS	VS	VS	VS	VS	VS

	Product >	Glint Field	Glint Winds*	Total absrb. (a)	Phyto abs. (a*)
	Activity \ T.M.>	GORDON	GORDON	CARDER	CARDER
1	product definition	HG,RE,DC	HG,RE,DC	SDST,RE,KC	SDST,RE,KC
2	systems design	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE	RE,MA,OB,WE
3	utilities	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA	SDST,RE,OB,MA
4a	Algorithms (Concept)	HG	HG	KC,MVT	KC,MVT
4b	Equations & Coefficients	RE,HG,DC	RE,HG,DC	KC,MVT	KC,MVT
4c	Prelnch at-sea algo. dev	HG, MVT	HG, MVT	KC,MVT	KC,MVT
4d	Postlnch at-sea algo dev	HG, MVT	HG, MVT	KC,MVT	KC,MVT
5	implementing code	RE	RE	RE	RE
6	peer reviews	MOT/MST	MOT/MST	MOT/MST	MOT/MST
7	integrated processing sy	RE/SDST	RE/SDST	RE/SDST	RE/SDST
8	Sim. data	Not Reqrd	Not Reqrd	Not Reqrd	Not Reqrd
9	systems tests	RE/SDST	RE/SDST	RE/SDST	RE/SDST
10	quality control process	HG,RE,SDST	HG,RE,SDST	SDST,RE,KC	SDST,RE,KC
11a	validation	HG	HG	KC, MVT	KC, MVT
11b	Postlaunch at-sea	HG, MVT	HG, MVT	KC, MVT	KC, MVT
12	correction of problems	SDST,HG,RE	SDST,HG,RE	SDST,RE,KC	SDST,RE,KC
13	documentation	SDST,HG,RE	SDST,HG,RE	SDST,RE,KC	SDST,RE,KC
14	management plan	VS	VS	VS	VS

Key	PI
MA	Abbott
IB	Barton
OB	Brown
KC	Carder
DC	Clark
WE	Esaias
RE	Evans
RH	Hoge
HG	Gordon
JP	Parslow
VS	Salomonson
MOT	Modis Oceans Team
MVT (MODIS VIS TEAM)	MOT-MIT
MIT (MODIS IR TEAM)	BROWN & BARTON
SDST	SCIENCE DATA SUPPORT TEAM
*	Research Product
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TABLE 4. MODIS ALGORITHM DEVELOPMENT AND VALIDATION DATA PRODUCTS:

	PRODUCT/PARAMETER	TEAM MEMBER									
		MA	IB	OB	KC		DC	WE	PE	FH	HG	JP
					I	II						S. O.
1	Incident Spectral Irradiance-Ed,Z(0,+)	C			C	P	P	C	C			P
2	Downwelled Spectral Irradiance-Ed,Z	C			C	P	P		C			P
3	Upward Spectral Radiance-Lu	C			C	P	P	C	C			P
4	Water-Leaving Spectral Radiances-Lw				C	P	P	C	C	C		P
5	Spectral Beam Attenuation Coefficients-c	C			C	P	P		C			P
6	Diffus. Atten. Coef. Downwel. Irrad.-KEd				C	P	P		C			P
7	Diffus. Atten. Coef. Upwel. Rad.-KLu				C	P	P		C			P
8	Photosynth. Active Radiat.(400-700nm)	C			C	P	C	C				P
9	Fluoresc. Line Magnit. @685 nm- FLM(z)	C			C	P	P		C	C		
10	Spectral Reflect.(or Radiance Factor)-RL				C	P	P	C	C			P
11	Phyto.Pig(Fluor.Tech.)Chlor.a and Phaeo.a	C			C	P	P		C	C		P
12	Phytoplankton Pigments(HPLC Technique)				C	P	P		C			P
13	Phycobilipigment Concentration				C	P				P		P
14	Total Suspended Matter(TSM) Conc.						P		C			P
15	Organic Suspended Matter Conc.						P		C			P
16	Inorganic Suspended Matter Conc.						P		C			
17	Temperature	C	P	P	C		C		C			C
18	Primary Productivity (14-C)	C			C	P	C	P	C			P
19	Salinity- S	C			C	P						P
20	IR Surface Brightness Temperature		P	P			C	C				C
21	Coccolith Concentration										P	
22	Humic and Fulvic Acid concentration				C	P				C		-
23	Particle absorption coefficient				C	P						P
24	Detritus absorption coeficient				C	P						P
25	Scattering coefficients (b, bb, etc.)				C	P					P	P
26	Total Dissolved Organic Carbon				C	P						P
27	Spectral Solar Atmospheric trans. (Ta)				C	P					P	
28	Airborne Fluorescences	C						C		P		
29	Airborne Radiances	C						C		P		P
30	Sky Radiance Distribution (spectral)										P	
31	Submerged Up Radiance Distribution										P	
32	Dissolved Colored Organic Material conc.				C	P						P

MA ABBOTT
IB BARTON
OB BROWN
KC CARDER
DC CLARK
WE ESAIAS
PE EVANS
FH HOGE
HG GORDON
JP PARSLOW

P Primary responsibility
C Contributor

I Case I
II Case
S.O. Southern Ocean

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MODIS Team Member Proposal
Data Requirements Form

Investigator: Salomonson

Output Product(s):
(1) Snow and Ice Cover (maps)
(2) BRDF over snow
(3) Surface radiation components over snow
(4) Relation between dynamics of snow cover and radiation balance

Resolution (Time): Weekly, monthly

(Space):

Domain (Space): global, continental, regional (watersheds, >>106 sq. km)

At/Post-Launch:
(1) At
(2)-(4) Unknown

MODIS-N/T: Both

Input Data: MODIS Level-1A (B) data

Spectral Bands Required: Bands 1, 6, 31, 32 (N)

Resolution (Time):

(Space): 250m (N), 500m (N), 1000m (N), 1.1km (T)

Ancillary Data Required (Type and Source):

Pre-Launch: **Size (Mbytes):**
ASAS, PARABOLA
Landsat TM data, AVHRR (algorithm testing)

Post-Launch: **Size (Mbytes):**
HIRIS, AMSR
1 km digital elevation model (DMA?),
Tanre's 5S Code (Tanre)
Validation: HIRIS, Landsat and SPOT
Snow cover: AMSR/HIMSS

Ground truth: PARABOLA and MMR

Algorithm Complexity (floating point operations/scan):

Algorithm Memory Required (Mbytes):

Data Storage Required (Mbytes/scan):
Output volume should larger than the volumes associated with the AVHRR LAC or GAC NDVI products because of greater number of bands. GAC AVHRR data requires 3 6250 bpi tapes per day and 45 LAC 6250 bpi tapers per day. Volume reduced for 1-wk to 1-mo products.

Look-Up Tables Required: Tanre's 5S Code, Digital Elevation Model
Size (Mbytes):

Lines of Code: 40,000-50,000 (including 5S Code)

Language Expected:

Accessory Output Products (e.g., field experiment data):

Pre-Launch: **Size (Mbytes):**

Post-Launch: **Size (Mbytes):**

Expected Need of SDST (Pre- or Post-Launch):

Post-Launch Expected Growth:

Quality Assessments:

Special Tilt Modes Required: Stare Mode +/- 50o

MODIS Team Member Proposal
Data Requirements Form

Investigator: Muller and Barnsley

Output Product(s): Level-3 Topographic Correction

Resolution (Time):

(Space): 1 km

Domain (Space): global

At/Post-Launch: At

MODIS-N/T:

Input Data:

Spectral Bands Required:

Resolution (Time):

(Space):

Ancillary Data Required (Type and Source):

Pre-Launch:	**Size (Mbytes):**
USGS DEM, NATO DEM, DMA DEM	≈32 GB
Tanre's 6S Code	
SBRDF estimates from AVHRR	
SPOT, Landsat, JERS-1, and ADEOS data	
ERS-1 and Seasat-derived DEMs	
Low resolution ERS-1 ATSR and Soviet 200 m conical scanner	

Post-Launch:	**Size (Mbytes):**
MISR-derived DEM data	

Algorithm Complexity (floating point operations/scan): 30 floating point and 20 integer operations per pixel.

Algorithm Memory Required (Mbytes):

Data Storage Required (Mbytes/scan): 150 GB

Look-Up Tables Required:

Size (Mbytes):

Lines of Code:

Language Expected: C++/UNIX

Accessory Output Products (e.g., field experiment data):

Pre-Launch: **Size (Mbytes):**
Limited amounts of SPOT DEMs to be provided to EOS-IDS teams

Post-Launch: **Size (Mbytes):**

Expected Need of SDST (Pre- or Post-Launch): USGS DEM and SBRDF from AVHRR (from EDC) are requested from the MODIS Project. Also a project bulletin board on E-mail for a record of EOSDIS-UCL (University College of London) exchanges.

Post-Launch Expected Growth:

Quality Assessments:

Special Tilt Modes Required:

MODIS Team Member Proposal
Data Requirements Form

Investigator: Muller and Barnsley

Output Product(s): (1) Scan-Angle Variance (Level-3)
(2) Spectral BRDF (SBRDF) (Level-4)
(3) Surface Spectral Albedo (Level-4)
(4) Aerodynamic Surface Roughness Length (Level-4)
(5) Climatological Land Inventory Maps (Level-4)

Resolution (Time): 10 days, monthly, seasonally, annually
(Space): (1) 1 km, 5 km, 50 km, 100 km, 200 km
(3) 1 km
(5) 1 km

Domain (Space): global - land only, including ice and snow

At/Post-Launch: Post

MODIS-N/T: Both

Input Data: Level-2 cloud-cleared, snow/ice flagged directional data

Spectral Bands Required: MODIS-N: Bands 1-7 All land bands
MODIS-T: Bands 1-30

Resolution (Time):

(Space): 250 m and 500 m bands on MODIS-N
1.1 km bands on MODIS-T

Ancillary Data Required (Type and Source):

Pre-Launch: **Size (Mbytes):**
Calibration/Validation:
SPOT 1.6 μm, Landsat TM, ERS-1/2 ATSR 1/2
(selected test sites)

Post-Launch: **Size (Mbytes):**
MISR Bands 1-4, 46M 1.92 km pixels for
16 days of global coverage
HIRIS 3 test sites every 10 days
Global topography (< 100 m resolution, < 25 m RMS height)

Sensor absolute orientation model
EPOP-1 MERIS and POLDER

Algorithm Complexity (floating point operations/scan):

Algorithm Memory Required (Mbytes):

Data Storage Required (Mbytes/scan): (1) 6 real numbers/pixel/λ
(3) 1 byte/pixel/λ
(4) 1 short integer/pixel
(5) 1 byte/pixel
Total for 1 km pixels = 128 GB

Look-Up Tables Required: Global topography (DEM)

Size (Mbytes):

Lines of Code:

Language Expected: C++/UNIX

Accessory Output Products (e.g., field experiment data):

Pre-Launch: **Size (Mbytes):**

Post-Launch: **Size (Mbytes):**

Expected Need of SDST (Pre- or Post-Launch):

Post-Launch Expected Growth:

Quality Assessments:

Special Tilt Modes Required: 'Stare mode' MODIS-T over land areas away from oceans

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MODIS Team Member Proposal
Data Requirements Form

Investigator: King

Output Product(s):
(1) Cloud optical thickness.
(2) Cloud effective particle radius.
(3) Cloud thermodynamic phase.
(4) Fractional cloud cover.

Resolution (Time): Week (4)
Month (4)
(Space): 1 deg x 1 deg (4)
Pixel (4)
Domain (Space): Global.

At/Post-Launch: At launch.

MODIS-N/T: MODIS-N (input)
MODIS-N & -T (output)

Input Data:

Spectral Bands Required: MODIS-N, channels 1,6,7,20 (1,2,3)
MODIS-N, channels 1,6,20,32 (4)
Resolution (Time): All measurements.
(Space): 5 km. (1,2,3)
Pixel (4)

Ancillary Data Required (Type and Source):

Pre-Launch: **Size (Mbytes):**
CAR
MODIS Simulator

Post-Launch: **Size (Mbytes):**

Algorithm Complexity (floating point operations/scan):

Algorithm Memory Required (Mbytes):
1800 LOC (1,2,3) + 13 MB radiative transfer code

Data Storage Required (Mbytes/scan):

Look-Up Tables Required:

Size (Mbytes):

Lines of Code:

Language Expected:

Accessory Output Products (e.g., field experiment data):

Pre-Launch: **Size (Mbytes):**

Post-Launch: **Size (Mbytes):**

Expected Need of SDST (Pre- or Post-Launch):

Post-Launch Expected Growth:

Quality Assessments:

Special Tilt Modes Required: None.

MODIS Team Member Proposal
Data Requirements Form

Investigator: King

Output Product(s): Cloud joint probability density function
Resolution (Time):

(Space): 1 deg x 1 deg.

Domain (Space):

At/Post-Launch: Post-Launch

MODIS-N/T: MODIS-N

Input Data: Cloud optical thickness, effective radius, cloud top pressure, cloud top temperature, effective emissivity.
Spectral Bands Required:

Resolution (Time):

(Space):

Ancillary Data Required (Type and Source):

Pre-Launch: **Size (Mbytes):**

Post-Launch: **Size (Mbytes):**
CAR (Validation)
MODIS Simulator (Validation)

Algorithm Complexity (floating point operations/scan):

Algorithm Memory Required (Mbytes):

Data Storage Required (Mbytes/scan):

Look-Up Tables Required:

Size (Mbytes):

Lines of Code:

Language Expected:

Accessory Output Products (e.g., field experiment data):

Pre-Launch: **Size (Mbytes):**

Post-Launch: **Size (Mbytes):**

Expected Need of SDST (Pre- or Post-Launch):

Post-Launch Expected Growth:

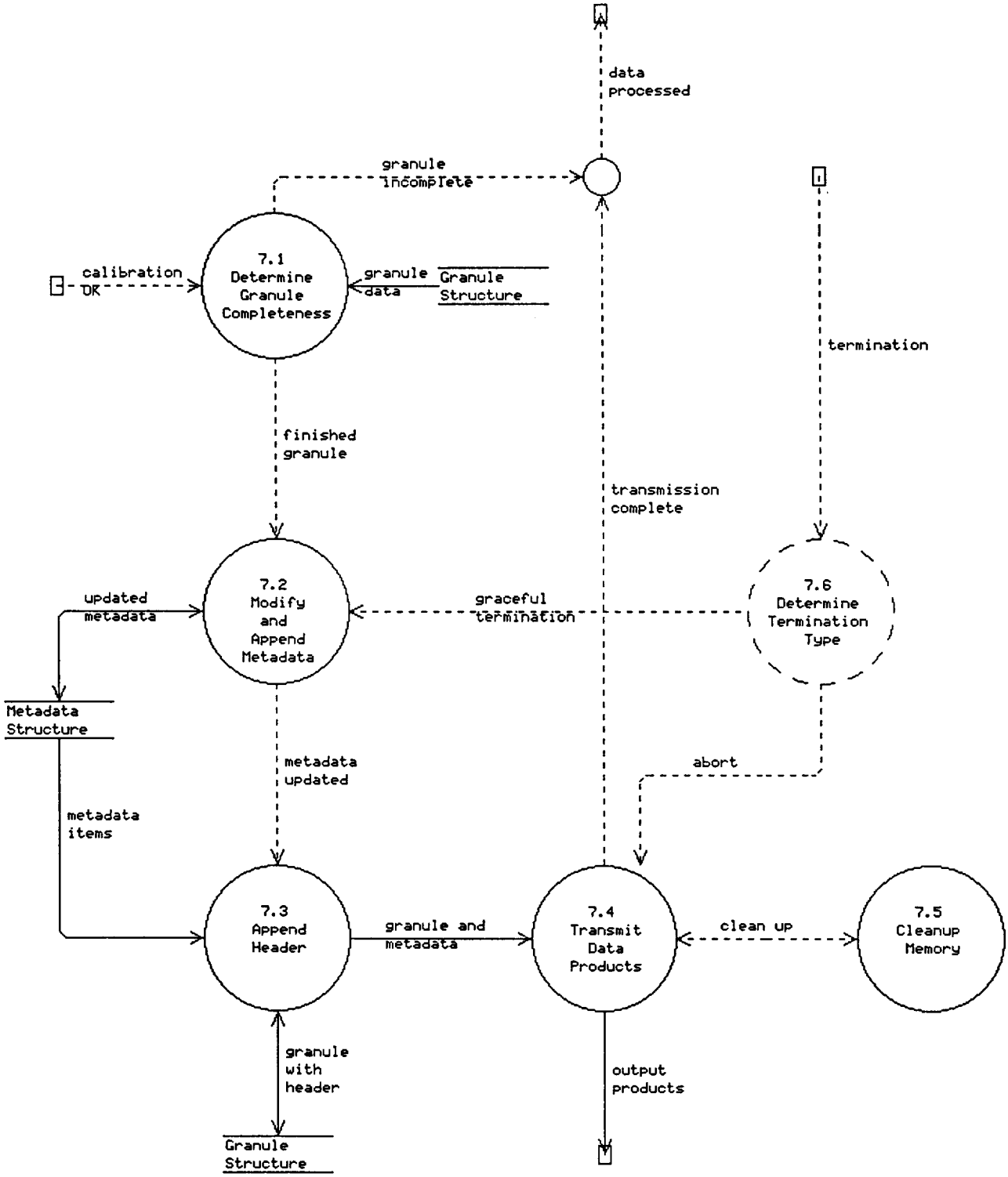
Quality Assessments:

Special Tilt Modes Required: None.

APPENDIX

PRELIMINARY LEVEL-1B DATA DESIGN

Project : \ECPLUS\MODIS-1B\
Chart : level-b7
Filename : level-b7.trg
Last Modified : 02-07-1991



Abort
Type: Control Flow
Location: 7.6 7.4

An indication to perform an immediate abort by releasing system resources (memory and disk space) and posting a termination message to the SCA.

Abort Cleanup
Type: Control Transform
Location:

Processes termination messages into the proper flow control items: either a graceful termination (all files written and closed) or abort-now cnodition (immediate termination without posting files). Posts an entry to the Processing Log.

Aligned Data
Type: Data Flow
Location: 4.3 5.1

MODIS data that has been placed into a valid computer data word type.

Allocation Parameters
Type: Data Flow
Location: Memory Allocation 2.3

A request to the operating system for storage allocation and a response with the storage parameters or alternately, an error message.

Anchor Points Appended
Type: Control Flow
Location: 5.0 6.0

An indication that the ground location anchor points have been appended to the granule (scene).

Anchor Points and Data
Type: Data Flow
Location: 5.0 Granule Structure

A quantuum of level-1A data, byte aligned and with ground located anchor points appended.

Append Header
Type: Data Process
Location: 7.3

Create and append the granule header. This is a superset of the Metadata items.

Availability Indices
Type: Data Flow
Location: 2.1 DADS

An enquiry to and a response from the external database containing a map of the data set sizes and completeness that is used to determine if the MODIS Level-1B procesing can be properly performed.

Begin
Type: Control Flow
Location: 2.4 3.1

An indication to begin processing MODIS data.

Byte Align Data
Type: Data Process
Location: 4.0

Extrace the data from the scan cube and byte/word align it. This places the data into a valid computer data type.

Calibrate and Convert
Type: Data Process
Location: 6.0

Convert the raw counts data to their physical measurements. Science data to albedo or energy values, engineering data to temperatures, positions, rates, etc.

Calibrated Data
Type: Data Flow
Location: 6.0 Granule Structure

The data contained in the granule subset (quantuun or scan cube) that is converted from instrument digital counts to the proper science or engineering dimensional units.

Calibration Coefficients
Type: Data Store
Location:

Parameters used to calibrate both the engineering and the science data from the instrument. This includes any instrument characterization infromation.

Calibration OK
Type: Control Flow
Location: 6.0 7.0

An indication that the MODIS data has been calibrated and converted to its final Level-1B format.

Calibration Parameters
Type: Data Flow
Location: 1.2 6.0 via Calibration Coefficient

Any data values or algorithms that are used to calibrate the instrument data.

Check Data Availability
Type: Data Process
Location: 2.1

Perfofrm a verification that the data (MODIS Level-1B granule and Metadata) required to complete the output granule ia available to this MODIS Level-1B program.

Check Granule Completeness
Type: Data Process
Location: 3.2

Determine if the computer output granule store has been posted to disk and enable this store initialization if true.

Clean Up
Type: Control Flow
Location: 7.4 7.5

An indication to perform the final clean up of data stores, posting a post event record to the SCA via this program's control mechanism.

Cleanup Memory
Type: Data Process
Location:

Deallocate the computer memory and disk store areas.

Continue
Type: Control Flow
Location: 1.3 3.2

An indication to continue the processing of MODIS data.

Control
Type: Control Flow
Location: SCA 1.1

Messages from the EOSDIS scheduler containing start, finish, and requests for dynamic status.

DADS
Type: External Entity
Location:

Data Archive and Distribution System. The EOSDIS core system program that manages the input and output product databases.

Data Available
Type: Control Flow
Location: 2.1 2.2

An indication that the data sets required to process the output granule(s) are available from the external database storage. This is expected to be in the form of database indices.

Data Byte Alignment
Type: Data Process
Location: 4.0

Input a quantuum of Level-1A data, unpack the data into valid computer data words, and check for any instrument problems or anomalies that may have been over looked in the Level-1A program.

Data In
Type: Data Flow
Location: DADS 4.1

Level-1A data products generated by the MODIS Level-1A program. This consists of the Level-1A data granule and the Level-1A Metadata.

Data Processed
Type: Control Flow
Location: 7.0 1.4

An indication that data hes been processed and more data is needed. This also indicates the completion of a granule (scene) of data.

Decompose Control Message
Type: Control Transform
Location:

Decomposes the incoming message to determine the type of message and where to send it.

Derive Status
Type: Control Transform
Location:

Handles problem (alarm) and event messages as well as data termination messages, posts entries to the Processing Log, and passes a Post Processing message to the SCA.

Determine Granule Completeness
Type: Data Process
Location: 7.1

Determines if an output granule (scene) has been completed. If so, pass the granule to further processing. If not, indicate to the centrol processes that more data needs to be processed.

Determine Ground Location
Type: Data Process
Location: 5.0

Determine the ground anchor points and append this data to the output granule.

Determine Memory Requirements
Type: Data Process
Location: 2.2

Calculate the memory and disk size requirements, knowing the processing mode, number of output granules, or other parameters.

Determine Termination Type
Type: Control Transform
Location: 7.6

Derive the abort or graceful termination type.

Determine and Transmit Granule
Type: Data Process
Location: 7.0

Perform final accounting at the output granule (scene) level. Create the granule header. Update or generate the metadata items. Transmit the data to the PMS. Deallocate memory and disc stores.

Dynamic Status
Type: Control Flow
Location: 1.0 7.0

The request for and returning of dynamic status information.

Dynamic Status Request
Type: Control Flow
Location: 1.1 7.0

A message originating via the SCA requesting that current processing information be posted into a return message. See Dynamic Status Response.

Dynamic Status Response
Type: Control Flow
Location: 7.0 1.4

An internally generated message to be sent to the SCA that indicates the current status (accounting) of the data processing task. See also Dymanic Status Request.

Event, Anchor Points
Type: Control Flow
Location: 5.0 1.4

An anomaly has occured in the calculation of the anchor points. This may indicate an off Earth point, Moon looking point, illegal point, or a numerical problem.

Event, Instrument
Type: Control Flow
Location: 4.3 1.4

An indication that an instrument event has been detected with a description of that event.

Finished Granule
Type: Control Flow
Location: 7.1 7.2

An indication that a granule of output data has been completed.

Graceful Termination
Type: Control Flow
Location: 7.6 7.1

An indication to perform a graceful, post data and update metadata, termination.

Granule Data
Type: Data Flow
Location: Granule Structure 7.1

The data contained within the granule.

Granule Incomplete
Type: Control Flow
Location: 7.1 1.0

An indication that a data granule is not complete and more data is needed.

Granule Initialization
Type: Data Flow
Location: 3.1 Granule Structure

Data values that initialize the internal granule store area to invalid data indicators.

Granule Location
Type: Data Flow
Location: 2.3 2.4

The memory addresses and file names of the data stores.

Granule Outline
Type: Data Flow
Location: 2.4 Granule Structure

Address, sizes and types of the MODIS Level-1B granule store area. Initialization does not occur here.

Granule Structure
Type: Data Store
Location:

The storage area for the data set granule (scene) containing a header with metadata values and instrument science and engineering data. Ancillary data such as calibration coefficients is also included.

Granule With Header
Type: Data Flow
Location:

The data granule (scene) with header information attached.

Granule and Metadata
Type: Data Flow
Location: 7.3 7.4

The fully completed Level-1B data granule (scene) and its Metadata.

Initialization Complete
Type: Control Flow
Location: 3.1 4.1

An indication that the output granule (scene) store has been initialized with invalid data indicators.

Initialization OK
Type: Control Flow
Location: (3.1,3.2) 4.1

An indication that the internal granule storage area has been initialized with invalid data indicators.

Initialize Granule
Type: Control Flow
Location: 3.2 3.1

An indication to place the invalid data indicators into the output granule (scene) store.

Initialize Output Granule
Type: Data Process
Location: 3.0

Place unvalid value indications into the output granule (scene) storage area in preparation for the next granule processing.

Initiate Termination
Type: Control Flow
Location: 1.1 1.3

An indicator to begin program execution termination. This may be either an abort-now (close files, deallocate memory) or graceful termination (post data before abort).

Input
Type: Data Flow
Location: Context Diagram

Consists of: Level-1A data or quick-look and locally maintained databases. (S/C ancillary data is included in the Level-1A data at this time.)

Level-1B Granule
Type: Data Flow
Location: Granule Structure 7.0

The final processed MODIS Level-1B data granule.

Log Entry
Type: Data Flow
Location: 1.2, 1.3, 1.4 Processing Log

A record to be posted in the EOSDIS (or other) master Processing Log. This provides an audit trail.

MODIS-1B Product Generation
Type: Data Process
Location: Context Diagram

Memory Allocation
Type: External Entity
Location:

An operating system memory (and disk) allocation routine. A process requests storage allocation and the system returns error or location parameters.

Memory Requirements
Type: Data Flow
Location: 2.2 2.3

The derived size of the Level-1B storage areas needed to process the output granules (scenes) of data.

Metadata Items
Type: Data Flow
Location: Metadata Structure 7.0

The items in the Metadata structure that are updated or derived in this MODIS Level-1B program.

Metadata Outline
Type: Data Flow
Location: 2.4 Metadata Structure

Addresses, sizes, and types of the metadata store allocation. This sets up the metsdata memory area and initializes that area with Level-1A metadata values and additional predefined values representing invalid data.

Metadata Structure
Type: Data Store
Location:

The storage area for the MODIS Level-1B metadata values.

Metadata Updated
Type: Control Flow
Location: 7.2 7.3

An indication that the Metadata has been sucessfully updated.

Modify and Append Matedata
Type: Data Process
Location:

Update any Metadata items and derive any new ones. This are placed into the enlarged Metadata store.

Next Data
Type: Control Flow
Location: 3.2 (4.1)

An indication that the MODIS Level-1B program is ready for the next quantuum of input data.

Output
Type: Data Flow
Location: Context Diagram

Consists of Level-1B products, Processing Log entries, Metadata, Browse data, and/or quick-look products.

Output Products
Type: Data Flow
Location: 6.0 PMS

MODIS Level-1B Products consisting of the data granules (scenes), enlarged Metadata, and Browse data. The products may be standard, reprocessed, or quick-look. The products can be either file names or file contents.

PMS
Type: External Entity
Location:

Product Management System. Performs management of processed data, adds further data quality (metadata) information before passing the data to the DADS.

Place Invalid Indicators
Type: Data Process
Location: 3.1

Put incalid data value indicators into the predefined output granule (scene) store in comouter memory. This provides an indication of granule completeness in the data granule without accessing the Metadata.

Problem, Calibration
Type: Control Flow
Location: 6.0 1.4

An alarm indicating a serious problem in the calibration of the instrument. This may be a loss of calibration parameters, numerical problems, or out of bounds condition.

Problem, Data
Type: Control Flow
Location: 4.1 1.4

An alarm that indicates that invalid MODIS Level-1A data has been received from tne DADS.

Problems and Events
Type: Control Flow
Location: 4.0 1.4

Any alarms or events that are to be detected at this Level-1B processing. This is probably a duplicate of the processing in the Level-1A program.

Problems, Initialization
Type: Control Flow
Location: 2.1 1.4

An alarm message indication that a serious problem has occurred in the initialization of required store areas. This could be computer memory or disk memory.

Process Control
Type: Control Flow
Location: Context Diagram

The SCA control of the initialization, dynamic status requesting, and termination of this program.

Process Control
Type: Control Transform
Location: 1.0

Handles the control functions of this program. Accepts and sends control information to/from the SCA.

Process Status
Type: Control Flow
Location: Context Diagram

The interface with the SCA consisting of Post Processing Status, Dymnamic Status Response, Alarms, and Events.

Processing Log
Type: External Entity
Location: 1.0

Log of processing status records, time sequential events. This is not the current status, but a time based history of status events.

Processing Mode
Type: Control Flow
Location: 1.2 2.2

The mode of processing (standard, reprocessing, quick-look) with any size parameters required.

Processing Status Information
Type: Control Flow
Location: 1.4 SCA

Information regarding the fault conditions and processing performance of this program. Status or completion information from the MODIS process to the SCA with abnormal, dynamic, or normal termination information.

Request Memory
Type: Data Process
Location: 2.3

Ask the operating system for system resources to allow the processing of this data set. This includes both computer memory and disk memory.

SCA
Type: External Entity
Location:

Schedule, Control, and Accounting. An EOSDIS core system process that performs scheduling, control, and accounting of the various Product Generation System (PGS) programs.

Setup Data Output Structures
Type: Data Process
Location: 2.0

Setup the memory areas and the Output Data Product areas in computer memory and disk. Preallocate these data and metadata areas.

Setup MODIS Data Stores
Type: Data Process
Location: 2.4

Determine all data stores. Initialize the "yet to be determined" Metadata items to an invalid condition.

Setup Processing Mode
Type: Control Transform
Location:

Derives the mode parameters, posts an entry to the system Processing Log, and starts the show.

Start
Type: Control Flow
Location: 1.2 2.1

An indication to start the processing of MODIS Level-1B data.

Start Process
Type: Control Flow
Location: 1.1 1.2

The result of an "Initiate processing" message type being passed to this MODIS Level-1B program from the SCA.

Termination
Type: Control Flow
Location: 1.3 7.0

An indication for the program to terminate immediately (abort) or gracefully (post remaining data). Either termination will cleanup and return any files or memory areas used to the operating system.

Transmission Complete
Type: Control Flow
Location: 7.4 1.0

An indication that the Level-1B data products have been transmitted to the PMS.

Transmit Data Products
Type: Data Process
Location:

Transmit teh Level-1B data products by either file name or records to the PMS

Unpack Data
Type: Data Process
Location: 4.2

Unpack the 12 bits plus scaling bit into a computer recognizable data type. This is to be performed in place to minimize store area sizes.

Unpacked Data
Type: Data Flow
Location: 4.2 4.3

The input data quantuum in an unpacked (byte aligned) form.

Updated Metadata
Type: Data Flow
Location: 7.2 Metadata Structure

Items from the previous Level-1A Metadatathat are to be updated and any new Metadata items for Level-1B.

Verified Data
Type: Data Flow
Location: 4.1 4.2

A MODIS Level-1A data quantuum that has passed verification checks.

Verify Data Quantuum
Type: Data Process
Location: 4.1

Ask for a quantuum of MODIS Level-1A data and verfiy that a piece of valid data has been received. Generate a problem alarm if invalid data has been detected.

Verify Selected Data
Type: Data Process
Location: 4.3

Perform any data value integrity tests. This may include items not visited in the Level-1A program in addition to newer items as defined during this processing level.